

## **Historic, Archive Document**

Do not assume content reflects current scientific knowledge, policies, or practices.



APR 1 1908  
O. E. S. LIBRARY  
O. F. S. LIBRARY

BULLETIN NO 11

1908

EXPERIMENT STATION

*Tuskegee Normal and Industrial Institute*

*TUSKEGEE INSTITUTE, ALABAMA*



The Relation of Weather and Soil Con-  
ditions to the Fruit Industry of  
Southeastern Alabama



*By*

F. HENRY CARDOZA

# THE TUSKEGEE EXPERIMENT STATION

## Board of Regents

PRESIDENT, CHARLES COLLEMAN THATCH.....	Auburn, Ala
HON. J. A. WILKINSON.....	Montgomery, Ala
MR. W. W. CAMPBELL.....	Tuskegee, Ala
MR. CHARLES W. HARE.....	Tuskegee, Ala
MR. A. J. WILBORN.....	Tuskegee, Ala
MR. BOOKER T. WASHINGTON.....	Tuskegee, Ala
MR. WARREN LOGAN.....	Tuskegee, Ala

## Station Staff

G. W. CARVER, M. S. Agr.....	Director
GEORGE R. BRIDGEFORTH.....	Assistant
*PERRY C. PARKS.....	Farm Superintendent
GEORGE W. OWENS.....	Dairy Herd
*FRANK HENRY CARDOZA.....	Horticulture
T. N. COWAN.....	Truck Garden
CHARLES JOHNSON.....	Beef Herd
*F. A. GREEN.....	Dairyman
C. W. GREENE.....	Home Farm
MARTIN VAN DARTHARD.....	Horse Barn
*GUY B. DOLLY.....	Ass't. to C. W. Greene
WILLIAM B. WILLIAMS.....	Poultry Raising
W. A. TATE.....	Asst. to G. W. Owens

\*Part of the term

# The Tuskegee Agricultural Experiment Station

---

BULLETIN No. 11.

JANUARY, 1908

---

## *RELATION OF WEATHER AND SOIL CONDITIONS TO THE FRUIT INDUSTRY OF SOUTHEASTERN ALABAMA*

*By F. HENRY CARDOZA*

In this publication we are going to make an attempt to advise with, and caution the farmers of the state, in the matter of paying more attention to the daily weather and soil conditions in relation to farm life and the farm home, with the idea in view, that though this be a new thing to most of our farmers, still they can and will be benefited by a little study of actual every-day occurrences.

The belt of the earth you live in or that part of the county where you reside, has a great deal to do with your farm success, and particularly in the fruit line. What we want to attain to in this bulletin is to get hold of some plain facts in relation to spreading out our small fruit industry where it will pay as to weather and soil conditions, and make it more than a secondary side issue, as is generally the case today.

It is not desired that you should branch out on a large scale in fruit trees at the expense of the vegetable garden and some staple crops as cotton, corn, potatoes, etc., where they pay well, because you are liable to fail, as will be shown further on; but it is our desire to be of help in pointing out how you can increase the value of your farm lands by keeping in close touch with the elements of plant food, heat, light and moisture, which are the fundamental principles of plant growth, or in other words, to watch the weather, to make better soil, to grow finer trees, to eat more fruit, to improve your condition.

All this obtains without doubt in this region of the "poor land district," where sand and chert beds, yellow clay galls, and more or less, steep sandy hills are greatest in abundance. Even the level or gently sloping lands with such a mixed foundation as the above tells, cannot escape our advice as to the weather and soil conditions that should be closely watched and necessary changes carried out.

It is certainly a hard piece of work to get "wornout," Southern soils, that have been more or less impoverished by long continued cotton growing, without rotation or beneficial fertilizers, or bad forestry practice of a generation ago, or even natural washes and "washouts" on probably virgin soil, resulting from heavy rains, into that state of fertility which will give steady gain at some period of the farmer's life, and not cause him to despair.

It is to aid in remedying such a state of affairs, as borne out by years of experience and observations here in Macon County, in particular, that we offer these suggestions. This does not mean to say that some of our farmers are not doing well on their sandy upland farms, but the majority of the farmers not only in sandy soils of Alabama, but any other of the Southern States having similar conditions, are not progressing as much as they might in

obtaining fairly maximum results from the rain that falls and from the soil that catches that rain. While the principle of the topic will hold in all general agriculture, we hope to apply it here especially to fruit growing.

In addition to the great variety of poor soils which we see here to build up, and the various problems that occur in their management, we see a greater and often unexpected variety of climatic conditions that make the landlord look sharply after his washable property, so as not to enrich the "bottoms" of his neighbor, nor allow his humus to "burn out" too fast and not add to an already too shallow soil; or his soils to change to lighter colors or hold less falling water for present or future use, or decrease the amounts raised on the land by droughts, or winter injury, and so on to the end. When such adverse conditions occur, as they do so often in any sandy section of the South, the tax on the vitality of the plants or trees is very great, and to successfully control the major portion of these ailments, we want to ask the soil to help us, and what the soil doesn't respond to, is hardly worth trying to battle against, as we will speak of that later on.

Whatever kind of bad case of soil despoilation we have, we would rather possess the Sunny South and the poor soil capable of improvement, than the zero Northern weather and the supposedly natural fertile soils of the North and West.

Now to get to our main subject, we wish to consider practical and scientific methods of improvement, and the first consideration is the addition of more humus to control excessive rainfall, gullies, seasonal droughts, humidity of soil and air, actual fertilizer value to the soil, increasing the rich color, and doing such things that commercial fertilizers can't do on the average type of soil here.

No commercial fertilizers should be used for the fruit tree until in its third or fourth year, when it is bearing fruit, and then, if the tree was started properly with a plentiful supply of barn manure and other humus material, only use some form of phosphate and potash in suitable quantity later on.

A large number of even intelligent farmers purposely set fire to grass or forage crops they fail to harvest, in order to plow the land easier; but they have yet to see that this is a terrible blunder, and that they need all this humus to decay in their soil, and the average soils here can't have too much of this. The point at issue is this, the average man doesn't see the value of utilizing every ounce of crab grass, cotton stalks, various weeds, oat straw, chips, muck soil, trash, etc., first as cattle or horse feed and bedding if possible, and then later add to the soil these same materials in a better form, all for the chief purpose of building up the land, and then make an essential step in controlling the rainfall on "sieve lands" or "sifting slopes," that is, sandy and leachy soils. You burn up the very material that will benefit your land to produce another crop instead of plowing it under. Such facts as these ought to be well known and borne in mind when we have or can get such materials to be used for fertilizer purposes. Every good farmer knows that his soil is seriously impaired for the growing of any crop if the humus is allowed to

burn out of it, and especially those farmers living on what the Bureau of Soils terms the Norfolk sand, etc., found within the coastal plain of the Southern States. It then becomes leachy, quickly loses its moisture and becomes excessively hot in bright sunny weather. Such remarks as these can be applied to nearly all soils, and as particularly fits our case in this belt. We want to emphasize the fact that it is far more important to increase and make better the texture or physical character of your level or hilly soils, than to attempt in a feeble way to increase the plant food content. To undertake the latter when the former is not properly fixed, is to put the cart before the horse, or going at things blindly.

As from 90 to 95 per cent. of all plant food comes from the air, it is essential that our friend humus be used to afford more air circulation to the soil and give the hundreds or thousands of roots and rootlets to our fruit trees an opportunity to breathe and spread out, to increase in size, vigor and producing capacity. It is not a surprise to Southern farmers to see a piece of sandy or clay soil, or half of both baked hard and losing its water fast, due solely to the lack of humus and mellowness in said soil, nor are we to forget the greater surface to the roots, giving a better root-hold and hastening availability of various natural elements already present in quantity.

There are even hillsides that demand underdrains because of the "springy" conditions of the soil that are easily remedied by ditching. The main items that we of the poor lands are concerned with are the common-sense methods of intelligent plowing, tillage, rotation of crops and incorporation of humus for fruit trees or any other crop.

Farmers as a whole do not appreciate the importance of humus as an improver of land, but instead use a short-cut and lazy way of improving, not the fertility of their land, but the yield of the current season's crop, by an application of inferior ready mixed commercial fertilizers. The most that the great majority of Southern farmers can do (unless they live on bottom or delta lands) is to slowly bring their orchard or other lands into such a condition that it will pay to put small amounts of high-grade, concentrated fertilizers, and not large amounts of inferior or bad fertilizers on it. In either case, for your sake and the land's sake, so repair your soil that the big rains won't wash away what you put there as a plant food. I know this to be of even more importance than to first terrace the land (if hilly) or using the combination hillside ditch and terrace. There is no doubt that the terrace system is ideal on some lands where needed, but I believe it ought to follow or go along with a systematic method of continually scattering and turning under some form of vegetable material, plus crop rotation, in order to hold the land together and to make it stick and refuse to wash and melt away with every heavy rain during the season. In addition to directly applying such organic matter at first hand the farmer should grow more winter cover crops. Even if they owned no cattle to graze such a crop in the fall, winter and spring months, the expense in growing the cover crop, would amply pay for itself in the amount



of vegetable matter or humus turned under, preceding any summer crop the farmer intended to plant, and also using up plant food that the rains would wash away forever.

Nine-tenths of Southern fruit lands and other kinds of lands also, owned by colored farmers, never receive winter treatment of any kind to get it ready to return the same or better plant food for the coming season as it did the season before. We see many parts of farms broken up into washes and gullies as in Fig. 1. Perhaps the owner or renter cuts down pine tops and puts in these places, with tops up the hill, but it is seldom that he goes much farther than that, and in time he abandons that part of his farm, because he has allowed the land and weather conditions to control him instead of his controlling them. It is pitiful to see such a large amount of such lands from the car windows and along the country roads, waiting for a master mind to take and make them do his bidding, but it demands a courageous spirit and capital to do so, after the careless and almost criminal methods used by previous cultivators.

We repeat that the average sandy and loam soils of this region, and in fact the majority of lands of the Southern Atlantic and Gulf States need more humus than they do chemical fertilizers. It is folly more than half the time, to yearly apply soluble or even temporarily insoluble commercial fertilizers to the soils that are not ready to profitably retain and use them on current season's crops, when the first big rain that falls will wash away dollars worth of work of applied plant food, even when such land is fairly level. Whereas, if these soils could receive the benefit of more forethought, of more systematic, intelligent management, as to constantly adding a mite of humus of some kind, with deep plowing in order to keep the land together and make it able to hold tightly what we apply later to it, there is no doubt but that the poor lands would give greater returns and have a better agricultural market value in the true sense.

Then also, this increasing of the mechanical contents of our soils will save some of the bills for commercial fertilizers, that is to say, we believe that where our soils hold the Southern rains to great advantage, no washing is brought about worth speaking of, and the natural food elements already present in the soil will become more readily available for the use of the current season's crop. We believe conclusively, that if the majority of farmers living on farms as already described would put the money paid for commercial fertilizers into buying barnyard manure, growing leguminous (pod-bearing) crops, primarily for green manuring, hauling forest leaves, straw, etc., in quantities to their barns for livestock bedding and thence to broadcast on land, or other ways and means of accomplishing the same ultimate results, there would be a much larger crop, and the land would be more benefited. This is the case primarily, when the majority of farmers buy small quantities of cheap commercial fertilizers, ignorant of their analysis and real uses. We cannot permanently improve the soil by using bag manures. Such is mainly for immediate needs of the season's crop. The general physical condition of the soil determines its value for cereals,



staple crops or fruit trees. It is the soil which contributes its share of the organic matter, conserved moisture, warmth and power to hold falling rain water that gives the fruit crop or other crops its growth and sustenance. The better the soil is fitted, therefore, to perform these necessary functions, the greater will be the possible growth and fruitage of our fruit trees in particular, and then later, the greater will be the need for available plant food to keep the growth and bearing up to the standard.

Successful crops of fruit have been grown in this section, even under very ordinary conditions, and this is enough to indicate that it should be tried to greater extent, especially on the "forsaken," gullied lands, by those who are willing to make the necessary effort.

Peaches, plums, cherries and grapes for home use and local markets are raised economically and well on the sandy soils. Enough apples in some parts are grown to supply partially the home markets, but this region is not generally suited to the production of apples. We know positively that there are certain soils and climates that will produce certain kinds of crops, and when we swerve too much out of this routine, it means a failure. There are certain conditions of soil texture, the contents of moisture, warmth and plant food application which produce a heavy crop, and if these soils and weather conditions are absent, it may mean a heavy loss in attempting to grow such. This is only generally true of the apple here.

When we want to specialize in the fruit line, what we want to do is to raise a good quantity and quality of the fruits we know most about, and best adapted to the soil, needs of the resident people, and let others alone. Increase the length of life that the average fruit tree in the South enjoys, by treating for general ailments, but particularly improving its home surroundings, the soil.

The existing orchard or the average farm today, has all kinds of crops growing on all sides of the individual tree, but this is wrong and is robbery. We want to emphasize the fact that both first and last preparation of fruit soils in the state is essential, and where such is not had, to work on the axiom of never too late to do good of some sort. Figure 2 shows decidedly the benefit derived as to saving the soil from not only losing in earth and plant food, but the depreciating of market value where our method or some other just as good, is not followed out. The planting of trees in this instance helps to save the land from wasting away, and at the same time gives us more money per acre, than can be obtained from most any other Southern crop on hilly land, but it is understood here that any highland soil of the state should have such immediate and ultimate treatment as humus so well affords. We have a very favorable climate in respect to average temperature and the annual rainfall (49.50 inches) is fairly well distributed and always sufficient, if properly husbanded, for the successful culture of all crops.

In Bulletin 8 of the Tuskegee Station, meteorological data collected for 1905, by Prof. G. W. Carver (United States Weather Bureau Volunteer Observer), show the following for more or less

excessive rainfall on certain days of a month, not including numerous other days giving lesser amounts of rain:

April 5th.....	2.30 inches
May 22d.....	.62 inches
June 5th.....	1.00 inches
July 24th.....	2.60 inches
July 28th.....	1.85 inches
August 9th.....	.41 inches
September 27th.....	.30 inches
October 10th.....	.93 inches

When it is considered that 2.60 inches of rain on one day means 262.86 tons of water per acre, and that most of the soils of this belt, in the poor land district are sandy and unprepared to hold such a deluge of water, without much damage and loss by serious washes, you can readily see why we lay stress on the fact that there is a close relation existing in the climatic or weather condition and the preparedness or not, in which your soil is, to withstand or successfully make use of any amount of rain water, regardless of the contour of your farm. We therefore believe and repeat, that such conditions can be largely controlled by a continual yearly, monthly or even daily addition of humus to almost any soil, except the supposedly rich soils in the swamps.

The old practice of some cotton farmers, collecting and burning the cotton stalks in the fall instead of successfully plowing them under together with crab grass growth of the late summer (Fig. 3) to add humus to an already exhausted soil, shows very little forethought for his best good. It is of more importance to use all such materials as cited above, including forest leave-, straw, barnyard manure, etc., strictly as humus, than it is to burn them and receive a pitiable supply of weak ashes in return. We do not believe it is possible for the cotton farmers to plant a winter cover crop of rye, wheat, oats, clover etc., for either winter grazing or summer harvesting, on such land that is to be put back in cotton the next spring, because of the necessary lateness in picking all of the seed cotton in the fall, and the early planting in March or April, showing that a cover crop in such a case, could not have time to make such growth to pay for the outlay, so that it is all the more important to save the late summer growths or crops which you do not harvest, to be used for the same purpose as a specially grown cover crop.

All farmers know something of terraces and hillside ditches, and there is no doubt but most Southern Alabama farms, unless more or less level, should be terraced, etc., in addition to what has already been recommended. In such a case, consult the nearest farmer who has had success in terracing and ditching his land, and get his aid in the matter. If this is not possible write to or visit the various agricultural schools of the state and get advice.

When the fruit crops are maturing and cultivation is temporarily stopped, generally some time in August, some prominent orchardists of other sections, allow a growth of crab grass and other annual weeds at this time, but we recommend here to plant cow peas, if possible. No farmer needs to cultivate his trees in particular, in a fruit year, after August 15th, or earlier, as nearly



FIG. 1. Washed soils.



FIG. 2. Saving the land by planting.



all fruits are harvested by that time here, but let the grass grow, and help to prevent the trees from a late growth of green shoots which cannot become sufficiently ripened to enter an uncertain winter.

Even in Southern Alabama, we have seen in early spring countless healthy shoots of young peach trees, winter killed or else dried out, because of this mistake of allowing or not attempting to stop unnecessary late summer growth. Such a growth of grass and peas or even grass alone is also beneficial in serving as a partial mulch through the winter and as a protection against the washing of the soil in winter. This practice is especially recommended where farmers do sow a special winter cover crop on the farm or in the orchard in early fall. Before closing, there are a few other weather occurrences demanding our attention.

In the South today, we suffer more from destructive frosts, freezes, etc., on tender crops, than regions farther north having zero weather, and yet on a whole, climate should not be held responsible for failures which are more or less directly chargeable to ignorance or neglect in other ways, as for example, injurious insects plant diseases, poor and untilled soil, lack of or too much water, no intelligent pruning, cultivation, fertilizing, etc.; all of which need vital attention.

The effects of spring freezes or frosts, or both, are largely beyond the practical control of the grower in the majority of cases, and especially on large areas. No benefit of consequence is to be derived generally from the practice of "smudging," by the method of large log fires to produce heat or a heavy cloud of smoke with the idea in view to prevent further radiation of heat from the earth too rapidly. Smudge methods or devices followed in California and lower Florida do not essentially obtain well here, due to locality, climate and peculiar soil, plant and unknown conditions of this belt. A destructive frost, as a general thing, follows the subsiding of a cold, all-day wind, but if the wind has been a dry one, and blown long enough to perfectly dry the moisture from blossom or fruit, a frost will do little damage, particularly to fruit trees in good condition.

It is a very costly procedure to burn many cords of high-price wood nowadays, and entertaining unreasonable hopes of halting the march of a determined and premeditated killing of the expected fruit crop. Sometimes the killing frost of spring is a blessing in disguise, giving the fruit trees and bushes a needed rest in their annual heavy production. It is a fact that if there is the least wind, light or heavy smoke or heat will not remain over the orchard, but will be blown straight up or far over the trees, where it could do no possible good, this is often the case when the wind is so light as not to prevent the formation of frost. I have no confidence in the enthusiasts of today on the subject of smudging, and these same gentlemen will eventually abandon the unwise practice of smudging in the inland Southern States as many others have done, such as the big orchards of the Fort Valley, Marshallville and Cuthbert level regions of Georgia, where it was found ineffective and costly. One of the largest fruit growers of North Alabama, yearly practices the building of large fires at the foot of

his mountain orchards (seemingly well located) so as the heat may help the trees, in its upward flight, to reduce the per cent. of damage by frost in spring. While this sounds very good, and probable in the latter instance, the value of the crop and the immense cost in the total smudge operation do not warrant such an investment against the unmerciful wiles of nature anywhere in this state, and we will finally adopt what other horticulturists of eminence have done, namely, to merely trust to Providence as the cheapest and surest way out of the difficulty.

A method of ultimately combating destructive spring frosts on peaches, in the South, advocated by Experiment Station horticulturists of Missouri, Georgia and Alabama and concurred in by the writer, is, the highly beneficial effects of whitening the entire tree in January and later, by some spray solution containing a large amount of lime. Where we are properly equipped with a technical knowledge of this subject, as well as with the materials and simple machinery necessary to have, then we will be able to carry out this splendid idea of preventing or retarding the trees and its flower buds from absorbing too great an amount of heat from the sun's rays at the wrong time of year, through reflection of the sun's heat from the white lime cover on the limbs and buds. This experiment of whitening peach trees to aid in retarding premature flower opening was carried out at the Tuskegee Station by the horticulturist in the months of January and February, with a large measure of success, using only twenty-five acres, with fifty acres as a check, sprayed in December. The trees sprayed in December blossomed two weeks earlier, although there was no other material difference otherwise noticed in the two checks.

Such an application would not only serve the purpose well, as could reasonably be expected, and hold the trees back for days and weeks from premature flowering in February and March, but this work would equal and even surpass the doubtful efficacy of the forms of smudging generally practiced in Alabama and Georgia. This method is also cheaper in many ways, but the chief one is the evident fact that while the cost in burning many cords of valuable wood in smudge piles, once or even twice, is very great, we do not get the same actual value as the cheaper, more reasonable and feasible plan of performing the double service of applying a needed insecticide and fungicide to the trees and at the same time working towards saving a possible future fruit crop.

Granting that smudging, regardless of the expense, may be practical on steep mountain and hill slopes, where orchards have fortunately been rightly located, etc., we do not advise the majority of the fruit farmers to burn smudge fires, but spray the trees white, and keep them that way until all danger of frosts is over, and you'll then have done all you need to or can do to protect your fruit from frost in spring, whether in large or small numbers.

The way to do this, is first to spray for the San Jose Scale, necessitating the using of a boiled solution of lime, sulphur and salt (see Bulletin 9 of this Station) and if the trees are sprayed well at least twice in dry weather with this wash, they show a solid white mass of brilliancy that not only kills the pernicious

scale insect, but retards to a later date the otherwise early circulation of sap, and consequent opening of flower buds. This white color on the trees will remain for months.

Again, to keep the spray idea uppermost, and still serving the double purpose, we can next spray for some fungus diseases, to which our orchards are the born heirs, this time using the Bordeaux mixture of lime, copper sulphate and water. Here we get ahead of a number of contagious diseases of leaf and fruit, nipping them in the bud in their delicate state, making our future fruit crop still farther away from the clutches of a killing spring frost.

A still further study of the practical and scientific aspects of this problem is still in order, but we believe that this last remedy has sufficient foundation and experience, back of it, to warrant recommending it to both large and small orchardists in the South as worthy of trial and conscientious undertaking.

There is one relationship of many years standing between the movements, positions and changes of the sun and moon with daily changes in the weather, but more so of the moon, which we hope will pass entirely away in the near future. The actions of animals, birds, or the condition of plant life can only show the present or past weather conditions, perhaps a couple of hours in advance, but no more than that. Long range weather forecasts, based upon the condition of the weather on certain days of the year, as seen in patent medicine calendars and almanacs, have for a basis superstition and ignorance. The supposed fact that the moon has a controlling influence in matters relating to planting, etc., is a fixed belief in the minds of the masses, and no kind of evidence of an opposite nature, in the form of long records of the Weather Bureau which fail to show any connection whatever between moon changes and the weather, will ever be sufficient to change this belief. And yet, all this superstition on changes of the moon, the ground hog, and other weather traditions, founded on anything but common sense, cannot live long and must eventually go. Our time for planting, seeding, etc., should be based solely on seasonal changes as suiting the crop to be planted, together with the desired temperature and moisture of air and soil, and we deny that the moon has anything of importance to do with such farm work.

In conclusion, it may as well be accepted as a fundamental truth that no system of farming or fruit growing can long continue to be prosperous and profitable unless it be based on soil improvement, unless we keep posted on the daily weather conditions in relation to the condition of our soil, and secondly to plant more and better fruit trees, (peaches, plums, apples, pears, cherries, pecans, etc.), also grape vines, strawberry plants, etc., in order to aid in the material development of our Southern earth.

Chemical analysis of poor lands in the South, is not so much needed as is the constant addition of humus in any available form because our lands here on the average, have not that strong "bottom" to them in the sense that the fertile lands have in Illinois, Iowa and Tennessee. Long observations and experience are the best aids in this direction. It is in this way that we reduce the cost



of production of our horticultural crops in particular, and that we add to the ultimate value of the fruit crops. We stop the losses in soil washing, plant food and market values, and we then are better able to appreciate the wisdom of preserving what is now good in the sandy and poor clay soils, so as not to be compelled to add greater amounts of humus and plant food later, at more cost.

A well balanced rotation also increases the supply of humus in the soil; this is a point of the greatest importance, for the humus, which is decayed organic matter, increases the plant food content of the soil and is a most potent factor in maintaining a suitable physical texture of the various fruit soils. Humus separates the soil particles and enables the plant to secure plant food. When the humus in large measure, is worked out of the soil, as it is in thousands of acres which have been cropped with grain and cotton for many years in the South, the soil bakes and refuses to be plowed deeply making a sickly looking tree or crop, and the farmer concludes that it is worn out, although the facts in the case are that the soil may contain a stock of mineral plant food ample for maximum results a great many years longer. As before said, humus absorbs moisture and stores up water for the use of the growing trees or other crops in a dry time, and tends to make available the plant food in the soil by reason of the acids which it liberates, for the breaking down of presently unavailable materials, making them soluble and useful.

We are going to find a vast difference in the richness of all of our soils, requiring more or less different technical treatment, but as a whole for the farm lands of this section of the Sunny South, we need more organic matter primarily. Even the strongest soils will eventually wear out altogether unless we use common sense methods in their management now. Sour soils need lime to correct the acidity, whether trees are being grown or anything else. Loose upland soils also benefit from lime, because of the binding of the soil grains together and holding more free water of real value.

Our relation between weather and soil conditions must increase in interest in the South necessarily, because of our love for the soil and the good that soil will do us. The living and growing tree speaks its own story as to the upbuilding of these soils, whether direct or indirect, and it is to our credit if we take advantage of the conditions afforded by nature to remedy existing soil evils, and instead have soil successes, by doing the right thing as modern practice and experience outline.

An effort to help the farmers of Alabama and the South should meet the approval of all, mainly because we want to see more land cultivated economically and profitably and less devastation carelessly allowed or tolerated. Let the fruit tree lend its aid as it does so in such an unselfish way, and if you treat it well, your soil and yourself profit. At the same time you make a more certain attempt at successfully controlling the inevitable downpour of water and heat that are at times, so constant and plentiful in this section, and so destructive of plant life and property on the kind of earth we inhabit. We can do well here if we will assist nature wisely.

Train your trees low to shade the ground more for the sake of additional moisture and to prevent sunscald, etc. Don't forget that the coarser your soil and the less clay and vegetable mold or humus it contains, the more rapidly will all surplus water carry far down in the subsoil, both the available and nonavailable plant food, where the majority of plants won't and cannot reach it.

The final point now to consider is, how can we easily add something to the soil to absorb the fertilizer elements, and not let adverse weather conditions or average rains cause a more or less heavy loss? The question is answered by humus generally, to make the soil a power for good, by making applied coarse barnyard manures show their value from year to year, instead of for a fraction of a season.

#### SUMMARY

Make the cow peas, clover and other legume crops your basis of first and future preparation of poor soils for fruits or any other crops. These crops are soil builders; and since they are successful here on our poor soils, they can be so anywhere else. Plow them under, use all the barnyard manure and other organic matter you can find and give capacity for producing crops of fruit never known before on the common abandoned lands of Alabama and elsewhere. This work together with the aid of your soil building plants will give vigor and producing power, stop the exhaustion of many years' standing and reclaim the farm from poverty.

The restoration of our soils must be mainly a physical one, and that means, first, deep plowing, secondly, apply decaying organic matter of any kind, third, decrease the effects of the sun's heat, by constant and proper cultivation, and affording the shade of a fruit tree here, there and nearly everywhere. Don't follow this advice for one year only, but for all time, as long as you own a farm or garden.

You can make your highland soils as good or better than your swamp bottom if you are determined to do so and work hard to that end. Really it is more a matter of working the brain for your own welfare, and the brawn will follow closely after, without much pushing.

When the two work energetically together on the average admirable fruit locations and sites that we have here, there won't be any more room for ignorance or money losses, but love for a profitable business.

F. H. CARDOZA.



FIG. 3. Cotton stalks five feet high successfully turned under.



FIG. 4. A properly plowed field.

